

REMARKS

Reconsideration of the application in view of the above amendments and the following remarks is requested. Claims 31-52 are in this application. Claims 1-30 have been cancelled. Claims 37, 42, and 48 have been amended. In addition to the amendments discussed below, the claims have been amended to correct inadvertent errors and alternately claim the invention.

Applicant requests the Examiner's permission to amend FIG. 3A as shown in red on an annotated copy of FIG. 3A, which is attached in Appendix A, to include reference labels for the top surface, the lower levels, and the upper levels of oxide layer 330. The specification has also been amended to reflect these changes. A replacement sheet for FIG. 3A which reflects these changes is attached in Appendix B.

The Examiner objected to the disclosure because applicant cancelled the Summary of the Invention section in the amendment received by the PTO on August 24, 2006. The Examiner argued that 37 CFR §1.37 requires a patent application to include a Summary of the Invention section. Applicant notes that 37 CFR §1.37 does not exist, and assumes the Examiner intended to cite 37 CFR §1.73.

Applicant notes, however, that 37 CFR §1.73 states "a brief summary of the invention . . . should precede the detail description." Since the operative word in this instance is "should" (as opposed to shall or must), there is not any requirement that a Summary of the Invention section must be included within a patent application. As a result, applicant has opted to omit these sections. Thus, in accordance with 37 CFR §1.111(b), applicant requests reconsideration of the requirement for a Summary of the Invention section.

The Examiner rejected claims 31 and 42 under 35 U.S.C. §112, first paragraph, as failing to comply with the written description requirement. The Examiner argued that there is no support in the specification for a first region and a second region of the wafer, a first region and a second region of the layer of first material, and a first region and a second region of the layer of second material. The Examiner also rejected 32-41 and 43-52 as being dependent on the rejected claims.

To satisfy the requirements of the first paragraph of section 112, applicant's originally-filed specification must provide support for the subject matter recited in claims 31 and 42. Applicant notes, however, that the subject matter of a claim need not be described literally (i.e., using the same terms or *in haec verba*) in order for the disclosure to satisfy the written description requirement. (See MPEP §2163.02.) In other words, a claim need not use the same words that are used in the specification to describe an example of the invention.

In the present case, the first region and the second region of the wafer can be read to be, for example, a lower level 312 and an upper level 314 of the top surface 310 of wafer 300. In addition, the first region and the second region of the layer of first material can be read to be, for example, a lower level 322 and an upper level 324 of the top surface 321 of polysilicon layer 320. Further, the first region and the second region of the layer of second material can be read to be, for example, a lower level 332 and an upper level 334 of the top surface 331 of oxide layer 330.

Thus, applicant's originally-filed specification provides support for the first regions and the second regions recited in claims 31 and 42. As a result, claims 31 and 42 satisfy the requirements of the first paragraph of section 112. In addition, since claims 32-41 and 43-52 were only rejected as being dependent claims, claims 32-41 and 43-52 satisfy the requirements of the first paragraph of section 112 for

the same reasons that claims 31 and 42, respectively, satisfy the requirements of the first paragraph of section 112.

The Examiner rejected claims 31-36, 38-39, 42-47, and 49-50 under 35 U.S.C. §102(e) as being anticipated by Li et al. (U.S. Patent No. 6,162,368). For the reasons set forth below, applicant respectfully traverses this rejection.

Claim 31 recites, in part,

“forming a layer of first material to contact the top surface of the wafer, the layer of first material having a top surface, the top surface of the layer of first material having a first region and a second region that lies above the first region of the layer of first material, the first region of the layer of first material being equal to a lowest part of the top surface of the layer of first material, the second region of the layer of first material being equal to a highest part of the top surface of the layer of first material;

“forming a layer of second material to contact the top surface of the layer of first material, the layer of second material having a top surface, the top surface of the layer of second material having a first region and a second region that lies above the first region of the layer of second material, the first region of the layer of second material being equal to a lowest part of the top surface of the layer of second material, the second region of the layer of second material being equal to a highest part of the top surface of the layer of second material, the first region of the top surface of the layer of second material lying above the second region of the top surface of the layer of first material.”

In rejecting the claims, the Examiner pointed to the formation of polysilicon layer 16 shown in FIG. 2A of the Li reference as constituting the “forming a layer of first material” element required by the claims, and the formation of native oxide layer 18 shown in FIG. 2A of the Li reference as constituting the “forming a layer of second material” element required by the claims.

In the amendment received by the PTO on August 24, 2006, applicant argued that the Li reference fails to teach or suggest that the first region of the top surface of the layer of second material lies above the second region of the top surface of the layer of first material. As shown in FIG. 2A of the Li reference, the lowest portion of the top surface of native oxide layer 18 does not lie above the highest portion of the top surface of polysilicon layer 16 as required by claim 31, but instead lies below the highest portion of the top surface of polysilicon layer 16. As a result, native oxide layer 18 can not be read to be the layer of second material required by claim 31.

From what can be determined, the Examiner did not address this argument in the present office action. Thus, since the Li reference fails to teach or suggest a layer of second material that has a first region of the top surface that lies above a second region of the top surface of the layer of first material, claim 31 is not anticipated by the Li reference. In addition, since claims 32-36 and 38-39 depend either directly or indirectly from claim 31, these claims are not anticipated by Li for the same reasons as claim 31.

Claim 31 also recites:

“performing a chemical-mechanical polish of the layer of second material and the layer of first material, the chemical-mechanical polish continuing until the layer of second material has been substantially all removed from the layer of first material, thereby forming the layer of first material to have a substantially planar top surface, the substantially planar top surface of the layer of first material lying over the first region and the second region of the top surface of the wafer.”

As noted above, the Examiner pointed to the formation of polysilicon layer 16 shown in FIG. 2A of Li as constituting the “forming a layer of first material” element required by the claims, and the formation of native oxide layer 18 shown in FIG. 2A

of Li as constituting the "forming a layer of second material" element. The Examiner also pointed to the chemical-mechanical polishing steps shown in FIGS. 2D-2F of Li as constituting the "performing a chemical-mechanical polish" element required by the claims.

In the amendment received by the PTO on August 24, 2006, applicant pointed out that FIG. 2C of Li expressly shows that after native oxide layer 18 has been substantially all removed, polysilicon layer 16 has a severely non-planar top surface. As a result, a claim would be clearly distinguishable over the Li reference if the claim recited that, at the instant the layer of second material has been substantially all removed, the layer of first material has a substantially planar top surface. This is because Li discloses just the opposite; that at the instant the layer of second material (native oxide layer 18) is substantially all removed, the layer of first material (polysilicon layer 16) has a severely non-planar top surface.

Thus, the question is whether applicant's claim language recites this distinction (planar versus non-planar top surface the instant the layer of second material (native oxide layer 18) is substantially all removed). Applicant has set forth an argument as to why the claim language recites this distinction, specifically referring to the terms "until" and "thereby" and the phrase "at which time." The Examiner, however, does not appear to have addressed why the claim language fails to recite this distinction, or why the claim language encompasses subsequent processes.

As a result, the chemical-mechanical polishing taught by Li can not be read to be the chemical-mechanical polish required by the claims. Therefore, since the Li reference does not teach or suggest the chemical-mechanical polish element required by claims 31 and 42, claims 31 and 42 are not anticipated by Li. In addition, since

claims 32-36 and 38-39 depend either directly or indirectly from claim 31, these claims are not anticipated by Li for the same reasons as claim 31. Further, since claims 43-47 and 49-50 depend either directly or indirectly from claim 42, claims 43-47 and 49-50 are not anticipated by Li for the same reasons as claim 42.

With further respect to claims 38 and 49, these claims recite:

“forming a layer of third material over the substantially planar top surface of the layer of first material, the third layer of material lying above and being vertically spaced apart from the second region of the top surface of the wafer.”

In rejecting the claims, the Examiner pointed to FIGS. 2A-2I, and the text from column 4, line 37 to column 6, line 54 of Li as teaching the formation of a third layer of material. In the Response to Arguments section, the Examiner pointed to FIG. 2I of Li and argued that polishing pad 110 (114) can be read to be the third layer of material.

In the amendment received by the PTO on August 24, 2006, applicant noted that polishing pad 110 (114) is not formed over the polished layer of material, but instead is placed over the polished combination of insulative layer 14 and polysilicon layer 16 shown in FIG. 2I of Li. Applicant argued that one skilled in the art would not understand the placement of a polishing pad to be the formation of a layer of material. From what can be determined, the Examiner did not address this argument. Thus, since one skilled in the art would not understand the placement of a polishing pad to be the formation of a layer of material, claims 38 and 49 are not anticipated by Li for this additional reason.

With further respect to claims 39 and 50, these claims recite “wherein the layer of third material is a mask.” In the Response to Arguments Section of the May

31, 2006 office action, the Examiner argued that the term "mask" does not have any special meaning because applicant did not define what the mask layer entails or represents in terms of its function and usage. Applicant, however, is not arguing that the term "mask" be given any special meaning, but that the term "mask" be given its usual and customary meaning in the semiconductor art.

The Examiner further argued that the term "mask" has a very broad interpretation and function in the semiconductor industry, and that a polishing pad is analogous to a mask for a CMP process. The Examiner then requested that applicant supply evidence that the function of a mask is different from the function of a polishing pad.

In the amendment received by the PTO on August 24, 2006, applicant provided the definition of a mask, and noted that since a polishing pad does not shield part of a semiconductor during an etching or deposition process, a polishing pad can not be interpreted to be a mask.

In the present office action, the Examiner does not appear to have addressed this argument. The Examiner pointed to no contrary evidence as to the meaning of the term "mask," but merely asserted that based on the plain interpretation of the term "mask," it is proper to consider a pad a mask. Applicant respectfully does not understand the Examiner's reasoning, which is because "the invention CMP process and pad layer used as mask during CMP process in the art."

Therefore, since a polishing pad can not be read to be a mask, claims 39 and 50 are not anticipated by Li for this reason as well.

The Examiner also rejected claims 37 and 48 under 35 USC §103(a) as being unpatentable over Li et al. in view of Weling et al. (U.S. Patent No. 5,378,318). In rejecting the claims, the Examiner argued that Li teaches all of the claimed

limitations except for a specific etch selectivity. However, as noted above, the Li et al. reference does not teach all of the claimed limitations. As a result, claims 37 and 48 are patentable over the Li et al. reference in view of the Weling et al. reference for the same reasons that claims 31 and 42 are not anticipated by the Li et al. reference.

The Examiner further rejected claims 40-41 and 51-52 under 35 USC §103(a) as being unpatentable over Li et al. in view of Sandhu et al. (U.S. Patent No. 5,381,302). In rejecting the claims, the Examiner noted that Li does not specifically disclose that the layer of third material lowers a resistance of polysilicon, but pointed to Sandhu as teaching the formation of a metallic layer 62 over a polysilicon layer 65 to lower the sheet resistance of the polysilicon layer. The Examiner then argued that one skilled in the art would have been motivated to form a metal layer over the polysilicon layer to reduce the sheet resistance of the polysilicon layer.

In the amendment received by the PTO on August 24, 2006, applicant noted that the Examiner has not read a polysilicon layer to be the third layer of material, but instead has read polishing pad 110 (114) to be the third layer of material. Applicant further noted that there is nothing in Sandhu that teaches or suggests that polishing pad 110 (114) lowers a resistance of doped polysilicon.

From what can be determined, the Examiner did not address this argument. Although it may be obvious to form a metallic layer on a layer of polysilicon to reduce the resistance, one skilled in the art would not be motivated to form a metallic layer on the planarized layer of polysilicon 16 shown in FIG. 2D of Li because Li teaches that the top surface of polysilicon layer 16 is to be further planarized as shown in FIG. 2E of Li.

Thus, since Sandhu does not teach or suggest that a polishing pad lowers the resistance of polysilicon, claims 40 and 51 are patentable over Li in view of Sandhu. In addition, since claims 41 and 52 depend directly from claims 40 and 51, respectively, claims 41 and 52 are patentable over Li in view of Sandhu for the same reasons that claims 40 and 51 are patentable over Li in view of Sandhu.

With further respect to claims 41 and 52, these claims recite "forming a mask on the layer of third material." In rejecting the claims, the Examiner pointed to Sandhu as teaching the formation of a mask over the metal layer (titanium) to keep the titanium over the polysilicon plug, while removing the titanium from the portion of the ILD layer.

In the amendment received by the PTO on August 24, 2006, applicant noted that the Examiner has read polishing pad 110 (114) to be the third layer of material. Applicant has been unable to find anything in Sandhu that teaches or suggests forming a mask on polishing pad 110 (114). From what can be determined, the Examiner did not address this argument. Thus, claims 41 and 52 are patentable over Li in view of Sandhu for this additional reason.

Thus, for the foregoing reasons, it is submitted that all of the claims are in a condition for allowance. Therefore, the Examiner's early re-examination and reconsideration are respectively requested.

Respectfully submitted,

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By: 

Mark C. Pickering
Registration No. 36,239
Attorney for Assignee

P.O. Box 300
Petaluma, CA 94953-0300
Telephone: (707) 762-5500
Facsimile: (707) 762-5504
Customer No.: 33402

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APPENDIX A

AMENDMENT IN RESPONSE TO OFFICIAL
ACTION MAILED NOVEMBER 8, 2006

Atty. Docket No. 100-13604
(P04797-F4)

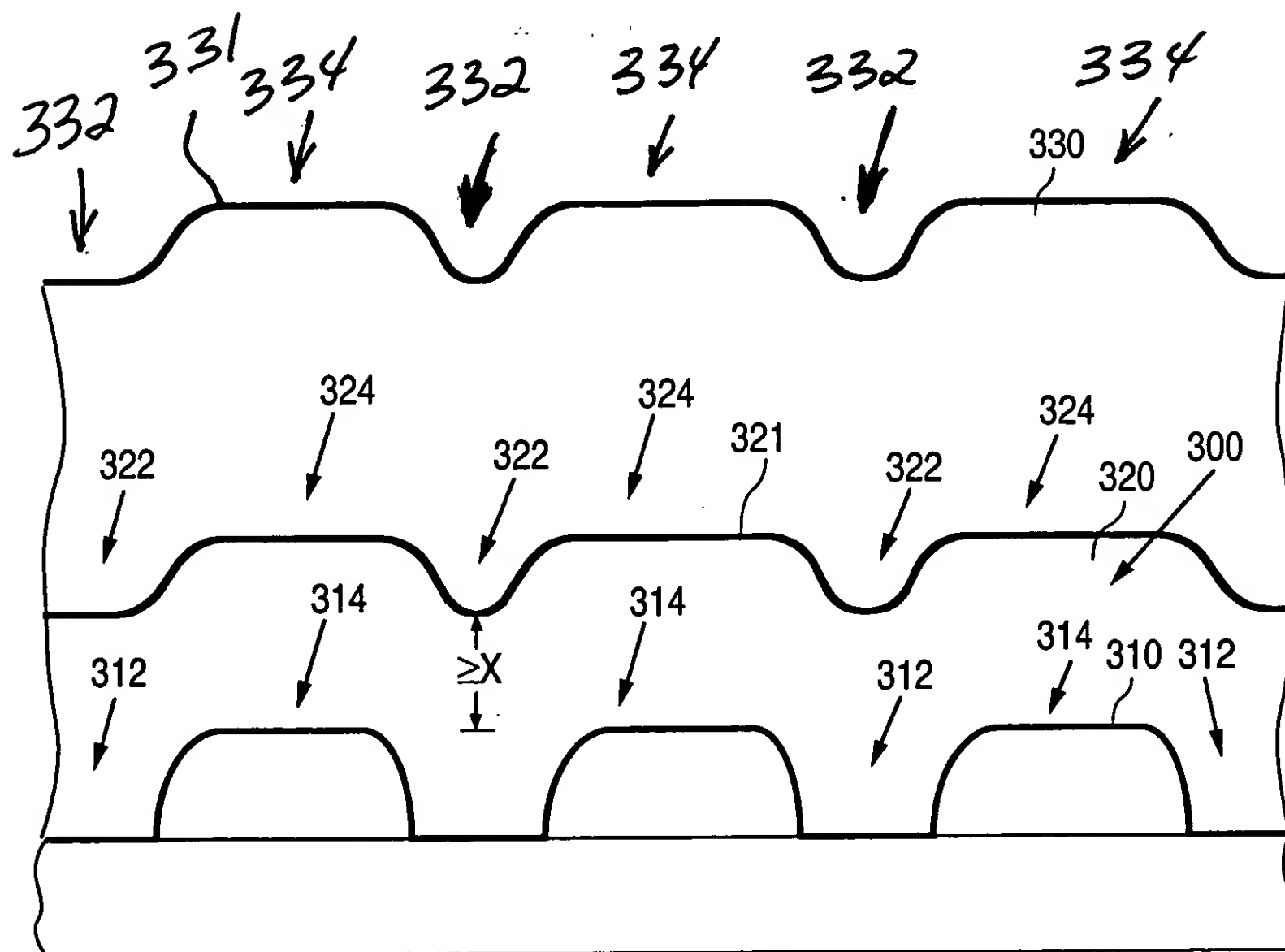


FIG. 3A

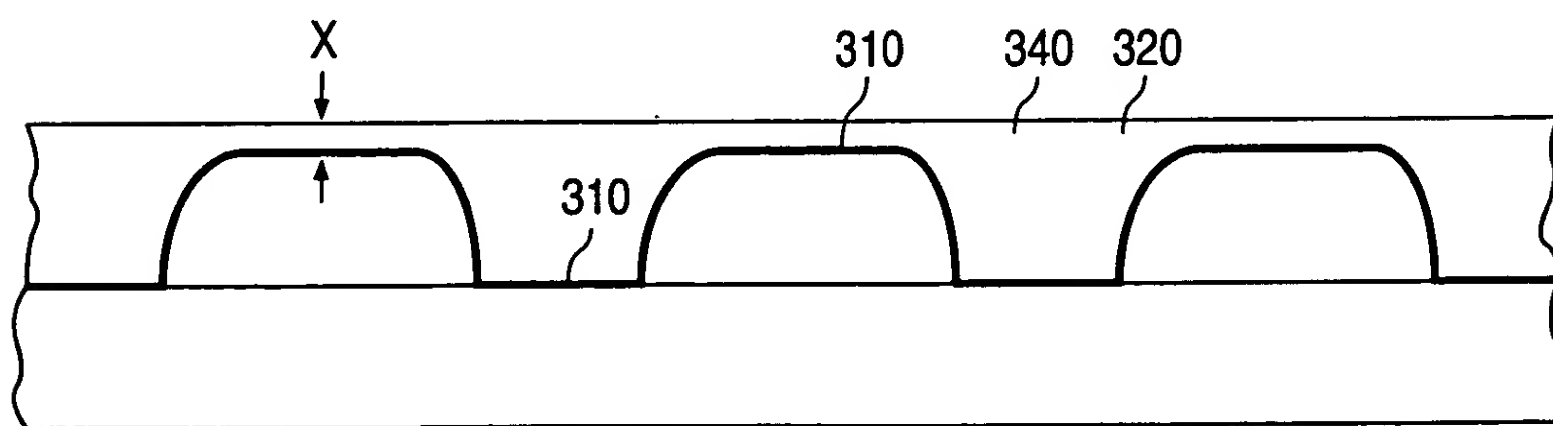


FIG. 3B

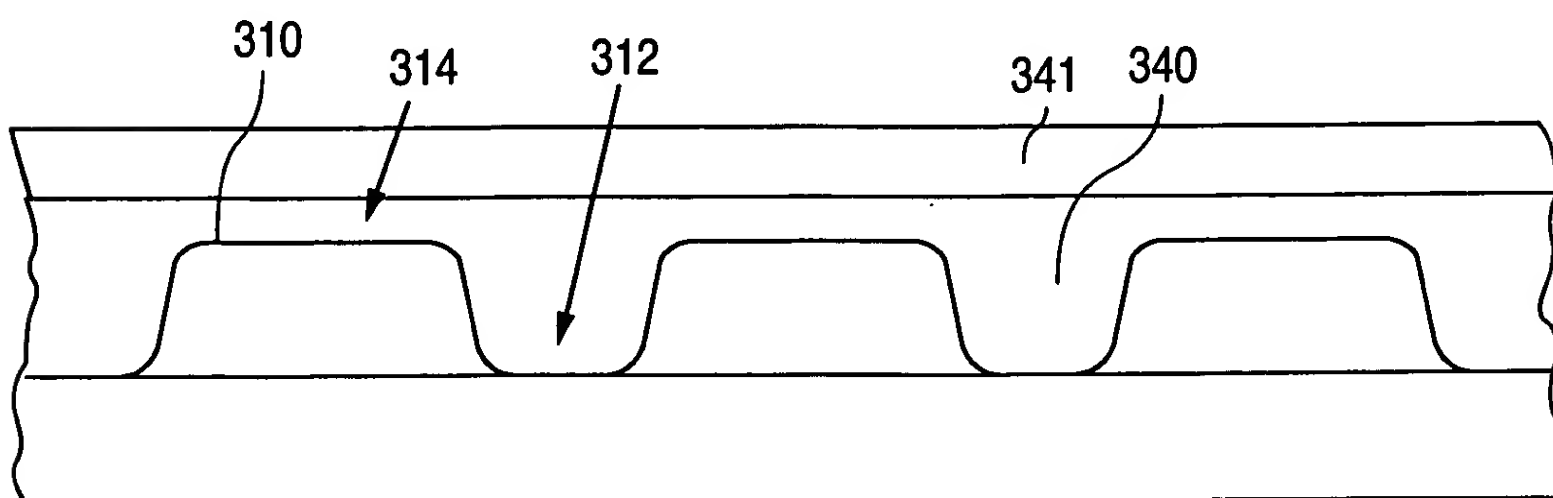


FIG. 3C

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APPENDIX B

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ACTION MAILED NOVEMBER 8, 2006

Atty. Docket No. 100-13604
(P04797-F4)